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an

Inaugural Dissertation

on

Diabetes

Submitted to the Medical

Professors

of the University of

Pennsylvania

By

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of Virginia

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Introduction

The subject which I have chosen for my inaugural Dissertation is that of Diabetes. It is one, I am aware whose pathology even at this enlightened period of Medical Science, is involved in obscurity and not agreed upon by Authors, and the treatment of which is not altogether settled among Practitioners. It is not my intention, nor do I think that it will be expected from me; to offer any thing new on the subject; My object is to bring into a Concise view some of the different Theories that have been entertained of the disease, and to select from among them, that which I consider to be founded on the strictest pathological principles, deducing from them the most approved practice. If I succeed in this, to the satisfaction of those to whom this imperfect Essay is more particularly addressed, I shall have accomplished all that

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I intended, and I have no hesitation in believing that for all minor defects, they at least, will make sufficient allowances

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Diabetes

The Name Diabetes is derived from the Greek word diabaino signifying to pass through. It Consists in frequent and Copious discharges of a limpid fluid from the bladder differing in its properties from healthy urine
Cullen has divided it into two species. 1. Diabetes Mellitus where the discharge partakes of the nature of honey
2. Diabetes Insipidus where it has no such properties
It is for the Most part attended with excessive thirst, a voracious appetite, a dry parched Skin, tongue Clammy, sometimes red, at others foul and white, a tough disagreable Mucus about the fauces, particularly in the Morning, great heat about the throat sponginess and sometimes ulceration of the gums, Constant pain about the region of the Kidnies, excoriation at the end of the urethra, heat and uneasiness about the stomach and bowels, particularly after Meals, Constipation of the bowels, and as the disease advances there is a peculiar odour exhaled from the body and sometimes from the Lungs resembling hay; the Mind

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now sympathizes with the body and the patient becomes fretful and dissatisfied, ever anxious for relief, but too unsteady to pursue any course for the attainment of it, as the disease advances emaciation increases, the extremities are attacked with Cramps or Spasms, the Saliva becomes more glutinous, and as the strength becomes still more exhausted in the advanced Stage, the lower extremities become Oedematous, the fluid discharged becomes less in quantity, and partakes more of the nature of healthy urine, till finally, exhausted Nature sinks under the force of the disease and death Closes the wretched scene. Such are the symptoms of the more Common forms of the disease, but it occasionally happens that instead of the large quantities of limpid fluid, there is less of it, and of an Amber-Colour, Sometimes Con=taining a large quantity of Saccharine Matter, at others little or none. There is also great variation in the appetite for food and in the thirst, in proportion as, the nutritious particles are dimi=nated from the System in greater or less quantities

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by the urine, there is a corresponding increase or diminution in those. It will be perceived that I have said nothing of the state of the pulse in this disease, it is so various according to the different circumstances of each case, that nothing could be deduced from it whereby the healing might be directed, I therefore thought it unnecessary to make any remarks on it. The accounts of the immense quantities of food and drink taken, and the urine passed by the patients, related by different Authors, are almost incredible, but they come from such high authorities that we cannot for a moment doubt the truth of them, I will not here enter into a minute detail of the particular quantities but will only cursorily mention that at an average in health the ingesta received in twenty four hours is equal to one eighth of the weight of the body, whereas in Diabetes, it is equal to one third
It is worthy of notice that those labouring under diabetes are exempt from all Epidemics.
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a lessening in quantity and an increase in the Colour of the urine, with a diminution of the Saccharine principle, the alvine discharges become more Copious and of a softer Consistence, the Cutaneous exhalation reappears and the strength and plumpness of the whole body return. The reverse of these are the unfavourable symptoms, and mark the approach to a fatal termination.

This disease for the most part is the sequel of intemperance and the Companion of a broken Constitution. It is produced by the too free use of ardent spirits, by diuretic Medicines, by acid drinks, fermented liquors, Sour wines, too Copious potations of any kind, excess in venery, a penurious vegitable diet, hard labour Connected with a poor diet, profuse evacuations, the debilitating passions, in fine, by any thing that produces general debility or tends to weaken the system, It some times however arises from no obvious Cause.

The appearances on dissection are not uniformly the same, the Kidnies sometimes appearing large and red, at other times flaccid with the vessels much

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dilated and easily torn, sometimes foreign bodies are found, as Calculi, at other times again, they appear almost liquified with the parenchymatous substance. ~~Substance~~ Nearly destroyed. The following is the result of Baillie's examinations. Says he "The veins upon the surface were much filled of blood than usual putting on an arborescent appearance, when the substance of both kidneys was cut into, it was observed to be much more crowded with blood vessels than in a natural state, so as in some parts to approach to the appearance of inflammation. Both kidneys had the same degree of firmness to the touch as when healthy; but I think were hardly so firm as kidneys usually are; the vessels of which were so much filled with blood. a very small quantity of a whitish fluid, a good deal resembling pus, was squeezed out one or two infundibula in both kidneys, but there was no appearance of ulceration in either. Upon first tasting the fluid I thought it had some degree of sweetness, but upon a repitition I was doubt=ful"

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after having enumerated the symptoms and causes of Diabetes it remains for me to say something of its pathology as preliminary to its treatment. This disease appears to have been known to Hippocrates, though it received no particular name till the time of Galen and Aretæus, who mention it under the various appellations of Dropsy into the Chamber Pot, Diarrhœa into urine, ~~Diarrhœa~~ Diabetes & Dipsacus. It was at that time a very rare disease as appears from the writings of that period, Galen mentions as having seen it only once, he undoubtedly considered it as a disease seated primarily in the kidnies, and depending on their atonic state, he considered Diabetes as a disease in the kidnies and bladder, similar to what lientery is in the stomach and intestines, and as in the latter the voracious appetite existing at the orifice of the stomach, with an inability to retain the large quantities of ingesta received, causes an accumulation of food with a consequent speedy and copious discharge; just so in the kidnies, the appetite exists for the serous fluid by which they secrete large quantities which is immediately ~~secreted~~ int the

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bladder. He pointedly denies that the stomach has any thing to do with the production of the disease, and defines it to be a peculiar affection of the kidnies themselves, analogous to the Canine appetite at the orifice of the stomach, with atony of the retentive powers; for if we suppose that it exists without excessive appetite, no urine worth noticing will in the first place, even arrive at the kidnies; and without atony of the retentive powers, the rapid discharge will not follow. Thus then he it is obvious he considered the excessive appetite and the atonic state of the retentive powers as necessary to the existence of the disease.

Aretaeus whom I have once before called your attention to, also speaks of it as an uncommon disease, he considered it as of a chronic nature, but when once established as very fatal. He calls it a colliquation of the flesh and limbs into urine, and supposes it to arise from the same causes as Dropsy, in fact, from his description of the disease, he looked upon it as a Dropsy, with this difference, that the fluid instead of being effused

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into some of the Cavities or the Cellular Membrane, takes a different rout and is thrown into the bladder; in other words a Misplaced Dropsy.

I deem it unnecessary to say anything of the opinions of more of the ancient fathers of Medicine, anterior to the time of Willis, who lived in the seventeenth Century. I will therefore pass down to this last Mentioned Author, who may be Considered as having made the greatest advancements in the knowledge of the Nature of Diabetes, and as the first who noticed the saccharine principle in the urine. He Considered Diabetes as a disease of the blood instead of the Kidnies, and the proximate Cause to be a loosened or dissolved state of the Mixture of the blood so much so that the watery parts are incapable of being retained by the thicker, and Consequently seperating from their Connection become impregnated with saline matter and pass off through the Kidnies. He allows that the Kidnies may sometimes Concur in becoming a part of the direct Cause "in as much" says he "as the ferment is occasionally wont to be

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so vitiated that it cannot keep the blood by the influx of the lixivial salt in its due mixture of fluidity, and for that reason the serum may be seperated from it by simple percolation; but it sometimes happens that the blood undergoes a precipitation as it passes through the kidnies, from an acid salt there deposited, producing by its coagulating quality, a great quantity of serous matter, which is presently carried away through the urines"

Cotemporary with, and a little after Willis, lived Sydenham, whose writings on Diabetes are very short, though it is plainly perceived by them, that his views of the nature of it were similar to those of Willis, but as I consider them (and more particularly those relating to the treatment) somewhat correct, I will take the liberty in this place of making an extract from them, "It sometimes happens" says he "although very rarely, that old men, who have previously laboured a long time under this (intermittent) disease, and have in the mean time been unskilfully managed by bleeding, and

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purging, fall into Diabetes, even though their fever at that time should have been perfectly subdued: for when their blood, debilitated by such treatment, is ren=dered altogether unequal to the assimilation of the juices which are brought to it, these being yet crude and unconcocted, find a vent by the urinary passages; and therefore, in consequence of the immense quantity of wine every time they take it, exerted, the powers of the body, by degrees, are undermined, and its substance is carried off as it were by this drain. In this affection, as indeed in every kind of Diabetes, arising from whatever cause it may, the Curative indication must be directed altogether towards invigorating and strengthening the blood, as well as restraining the preternatural flux of urine" after this follows a prescription for an aromatic electuary, which is bitter and astringent; and for an infusion of some warm bitters and aromatics in Canary wine. "Let the patient" he adds "eat food of easy digestion, such as veal, mutton, and the like, and abstain from all sorts of garden stuffs; and at all his meals

drink Spanish wines" Now with the exception of the wine, I do not know that these directions with respect to diet could be greatly improved even at the present day. From Sydenham, by a progressive gradation, I descend to Cullen, another of the brilliant luminaries in the profession of Medicine. The Doctor candidly acknowledges, that as the proximate cause was so little known he could offer no rational method of cure in the disease He says he thinks it probable that the proximate cause may be seated in the assimilatory apparatus, or in those powers employed in the conversion of Chyle and the alimentary substances into the proper animal fluids, but at the same time remarks, that he thinks the theory encumbered with some insuperable difficulties, he considers, that a conclusive evidence against the topical affection of the Kidnies, having a hand in the production of the disease, and in favour of its being a fault in the assimilatory process, is, that the solid food taken in increases the quantity and the saccharine quality of the urine. He thinks that the insipid species

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of the disease is very rare as he never saw but one case of it, and observes that the same remark had been made by Martin Lister. He considered it as almost one of the opprobria Medicorum, and says that he believes from the testimony of several Authors that it had been cured, but that not one case that ever came under his own care or of any other that he ever heard of in Scotland, was ever cured.

Thomas gives it as his opinion that the primary seat of this disease is in the kidnies themselves, and that it consists in a perverted or deranged action of them, and as the effects of which action, the saccharine matter in the urine is produced. This opinion he thinks corroborated by the appearance of the kidnies on dissection. The increase of appetite, and the derange-ment in the process of chylification, he looks upon as the effects, rather than as the cause of the disease

Rollo is decidedly of opinion that Diabetes is a disease of the stomach, and consists in a deranged state of the processes of digestion and chylification, it is to him that the profession of Medicine is more particularly

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indebted for the most successful mode of practice in Diabetes. His judicious treatment in this disease, has immortalized his name in the records of Medicine, and will hand it down to posterity as that, of the deliverer of the human race from a most distressing (and in the estimation of writers prior to him) an incurable disease. Before dismissing this part of the subject there is one more hypothesis lately advanced by Hufeland which may be well to notice as it is new, and one I think that may lead to some useful indications in the treatment of this disease. It is this, that Diabetes Mellitus is gradually increasing in frequency while Calculous diseases are in the same proportion decreasing, the last of which he says has been attributed to the free use of diuretic drinks more particularly of Tea and Coffee. Now the inference he wishes to draw from this, is, that there is a strong analogy between the causes and nature of the two diseases, he supposes that the production of sugar may be a modification of lythic matter, the uric acid being combined with some substance producing sugar, instead of

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with Mucus or earthy particles forming Calculus. admitting this to be correct, he thinks it probable that the same remedies may be useful in the saccharine, as in the calculous produc=tions, such as soda, Potash. soap &c

I might go on to enumerate the opinions of many other writers on this disease, but I conceive it unnecessary as those which I have noticed comprehend all the rest.

Taking a view of the opinions of all the different authors I have consulted, it is perceived that there is nearly an equal proportion of advocates on each side of the question, whether to locate the primary seat of Diabetes in the Kidnies or in the digestive and assimilative organs? I think however that the preponderance is in favour of the latter opinion, I con=sider then that the proximate cause of Diabetes is some peculiar defect in digestion, Chylification, or assimilation or perhaps in the whole. The aliments whether fluids or solids received into the stomach undergoes imperfect digestion Chylification or assimilation, is converted into blood whose component parts are imperfectly held in union, this imperfectly formed blood is carried through the coat of the

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circulation until it arrives at the Kidnies, where by their own peculiar action the diabetic urine is secreted. The saccharine principle, I consider as being formed before the Chyle enters the circulation where it is imperfectly assimilated, though after becoming blood it contains no sugar* for in that case it could not be blood, in as much as I believe that no substance enters the circulation under any other form than that of blood but it contains the ingredients capable of being again converted into sugar at the time that the urine is secreted. So far from looking upon the Kidnies as being primarily diseased, I rather consider the increased quantity of urine secreted by them as an evidence of their being in a sound and healthy state by which they are capable ~~caused~~ of being roused into in=
=creased action by the stimulus of the imperfectly formed blood, this I believe from analogy, as it is well known

* This has been satisfactorily proved by the experiments of Marcet and Wollaston made on the blood of diabetic patients from which there could not be obtained a particle of saccharine matter but it was obtained in large quantities from the urine of the same patients at the same time. See Philos: Trans: of the Royal society of London

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to be a common property with all the glands in the body, to be increased in their action by the application of any stimulus. thus for example, the Salivary glands are increased in their action by the stimulus of Mercury, the liver by that of heat, the testicles by that of lascivious thoughts &c It may perhaps, and with propriety, be asked, why this secretion is not performed by the other glands of the body as well as by the Kidnies. I answer, that the secretion of the Kidnies differs from that of any other gland in the body in as much as the secretions of the other glands are appropriated to some particular use in the animal economy, whereas that performed by the Kidnies is thrown out of the system as useless matter. it is the peculiar office of the Kidnies to secrete from the blood whatever is excrementitious, useless, or noxious. Thus we do not uniformly find in the secretions of other glands of persons who have been taking turpentine, garlic, asparagus and other such substances, their peculiar properties, as we do in the urine. The lungs and skin however do appear to perform a vicarious office of this kind, as is proved by

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the peculiar Halitus which was described when giving the symptoms of the disease, as arising from them. This I consider to be the saccharine or some other principle separated from the blood along with their own appropriate secretion. Thus then from what has been said, I think it reasonable to conclude, that the primary cause of Diabetes, is an imperfect digestion, Chylification or assimilation or a defect in all of them. But although it will not be denied I presume, that the other glands of the body do occasionally separate, with their own appropriate secretions, something from the mass of blood, which has been imperfectly assimilated with it, yet as the manifest function of the kidneys is to separate excrementitious matter, there is no just reason to suspect in them any primary disease, but so far otherways we should reasonably conclude that Diabetes is the effect of the natural and healthy action of the kidneys upon imperfectly formed blood, and that the fluid thus secreted, from its quantity perhaps as well as its quality, induces still more and more the excessive discharge constituting the disease called

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Diabetes. Now when I have given what I conceive to be the most correct pathology of the disease, it remains for me to say something of its treatment, This, however when contemplating the rare occurrence of the disease, the obscurity into which it is involved, and the inexperience which he must necessarily possess, who is but just treading the threshold of Medical Science, I undertake with no small degree of diffidence.

It is obvious that the treatment in this, as in every other disease must have been much influenced by the different opinions entertained of it by different practitioners, thus those who considered it as a primary disease of the kidneys, directed their treatment more particularly to them, whereas those on the contrary who considered it seated in the primæ viæ directed their remedies to that part, but at the present day, however much divided writers may be about the seat of the disease, I believe that they are nearly unanimous in adopting the same mode of treatment as that recommended by Rollo

Believing there as I do, that the disease consists in some

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defect in the functions of the first passages our attention must be more particularly directed there. The first indication to be fulfilled, is to prevent the formation of sugar which process I am inclined to believe is very similar to acescency, this by the experience of Rollo, and those who have followed him, is most effectually done by a strict adherence to an animal diet, and abstinence from all vegetable food, from vinous, spirituous, and fermented liquors, in place of these for the patients common drink, he make take lime=water or some of vegitable tonic infusions acidulated with nitric acid.
To answer the same indication and to give tone to the diges=tive organs, I conceive that the alkalis, absorbents, astringents and tonics are of the utmost utility. As the fixed alkalis have a determined action on the kidnies, the volatile is preferable. Among the tonics the preparations of Cinchona, the Chalybeates and the other Metalic tonics as the preparations of Zinc, Copper &c the best adapted, the salts of Bark I think here peculiarly well adapted, as in that preparation the tonic properties are obtained without the necessity of giving so much fluid as in decoction, or so much of the vegetable

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principle as in substance or powder; when used in decoction it should be prepared with lime=water. Combinations of Iron, Zinc, and Nitrate May be given. The preparations of Copper Doctor Coxe thinks, May have a specific effect independent of their tonic virtues. as sugar is used as an antidote to its preparations, so he thinks these may be used to prevent its formation. Among the absorbents, perhaps the Magnesia and Carbonate of lime are to be preferred. as in this disease the skin is harsh and dry, diaphoretics are imperiously called for. Here the Ammonia again becomes useful, the Hepatized is highly recommended by some, the various preparations of antimony and other diaphoretics, which the sagacity of the practitioner May dictate, May be interposed with advantage, It is necessary to bear in mind however that in giving the preparations of antimony they should not be given in combination with any of the vegitable astringents as a chemical decomposition of the antimony takes place and its virtues undered thereby effete. To fulfill the two fold indication of giving tone to the system and at the same time of determining to the surface, gentle exercise is of the greatest

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utility. As the bowels are usually costive, attention should be paid to them by interposing a laxative occasionally
Latham recommends the phosphoric acid very highly and says, that he has used it with the greatest advantage
The reasons that first induced him to employ it, were that phosphoric acid which enters into the composition of healthy urine, is nearly altogether absent in diabetic, and that the animal diet found so useful in this disease yields a large proportion of the acid, while the vegetable under the use of which, the disease rapidly increases, yields little or none. It will be perceived in the preceding pages that I have not ~~have~~ been particular in directing the doses of the different medicines which I have recommended, this I have intentionally omitted, knowing that every practitioner will adapt his prescriptions to the particular circumstances of the case
Before finally dismissing the subject I beg leave to call your attention once more to what I conceive of the highest importance in the management of this obstinate disease, my allusion is to the imperious duty that devolves upon

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to impress upon the Minds of our patients and their attendants the great and absolute necessity of a strict adherence to an animal, and abstinence from a vegitable diet, as I look upon this as the principal and all others, as mere auxiliary means of Cure

October 28th 1822

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#12. 1824

G.

Diabetes

W. P. Horsh.